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MEMORANDUM OF FACTS
RE
OCEAN DISPOSAL OF ARSENICAL INDUSTRIAL
WASTE PRODUCTS GENERATED AT WHITMOYER
LABORATORIES, INC., MYERSTOWN, PENNSYLVANIA

FORMS OF ARSENICAL WASTES

There are, broadly speaking, two forms of arsenical wastes involved in the ocean disposal practices of Whitmoyer Laboratories, Inc.: solid, non-soluble wastes (approximately 8% arsenic), and liquid, soluble wastes (approximately 3-4% arsenic). Of the arsenic present in the two forms of waste, only one half of 1% of the liquid waste is present as arsenite, the trivalent, toxic form of arsenic. All of the rest is in the pentavalent form.

VOLUMES OF MATERIAL INVOLVED

Solid Wastes - Currently approximately 750 net tons per year of solid, non-soluble arsenical wastes are disposed of in the mid-Atlantic. This results in the deposit of approximately 60 tons of arsenic in pentavalent form per year.

Liquid Wastes - Currently approximately 3,000,000 pounds per month, or approximately 18,000 tons per year, of liquid soluble arsenical wastes are disposed of by dispersion in the

sea beyond the continental shelf (approximately 100 miles from shore) in the Atlantic ocean. This amounts to dispersion over a 12-month period at approximately 2-month intervals of a net amount of approximately 600 tons of arsenic, substantially in the pentavalent form, per year.

COMPOSITION OF WASTE MATERIALS

Solids - Two thirds of the solid waste materials are virtually inert, dense, tar-like substances which are accumulated in the bottom of aniline stills. The arsenic is present as a high molecular weight substance. The arsenic content constitutes approximately 12% of the tar-like substance. These are noncorrosive, virtually insoluble, materials which are more dense than sea water. The arsenicals are in the pentavalent form. Even if the arsenic were in a form that could be ingested, it would not seriously inhibit metabolic activity because the pentavalent form of arsenic is of a relatively low order of toxicity. It is generally understood that the arsenic present in the ocean is arsenate, i.e., arsenic in the pentavalent form.

One third of the solid waste materials consists of spent, wet, charcoal filter cake and filter cloths containing from 2-3% arsenic in a form of arsanilic acid which is pentavalent; and of a low order of toxicity.

Liquids - These wastes are a saline solution consisting of approximately 78% water, 13% salt and the balance consists of AR 100177

a combination of organic and inorganic arsenates and a small fraction (less than $\frac{1}{2}$ of 1%) of arsenites. The amount of elemental arsenic present is 3-4%. All but the arsenite fraction of the arsenic is present in the pentavalent form and is of a very low order of toxicity. There are no solid or coagulated materials in this liquid waste. All of the components are soluble in sea water and are rapidly dispersed when released to the sea. If the presence of the arsenite fraction is considered a cause of concern, we are confident that the arsenite can be converted to arsenate thereby assuring that the entire percentage of arsenic present in this liquid waste will be in the pentavalent form and compatible with the arsenate already present in the ocean.

METHODS OF DISPOSAL OF MATERIALS

Solid Wastes

The tar-like still bottoms are placed in high quality steel drums, care being taken to fill the drums without any air pockets to assure no flotation of the drums when they are jettisoned to the sea. Drums are filled to 535 pounds or greater weight to assure their sinking even if there should be air pockets. Tests were run to make sure that the contents would not cause rapid corrosion of the drums. This precaution was taken to assure safe handling and storage. It has no substantial bearing on the question of the effect of the disposal of this material at sea.

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The spent charcoal filter cake is drummed in a manner similar to the tar-like substances but there is a small amount of water present because the sand-like filter cake is wet when drummed.

Our information from the steamship companies is that all of the drummed material is disposed of at between 200 and 1500 miles out to sea by being jettisoned overboard from the decks of transatlantic freighters. The steamship lines report that the steel drums do not burst on the surface of the sea when jettisoned and appear to sink immediately. The drums of spent filter cake may burst open several hundred feet below the surface but the contents would disperse readily and not create a concentration of arsenic. The amount of arsenic present in the filter cake amounts to 2-3% and is the pentavalent form of arsenic.

Disposal by depositing the material far out at sea is carried out not because of the immediate or potential toxicity of the material, but because this is an entirely practical disposal method which reduces to an absolute minimum any deleterious effect on the ecology from the point of view of either damage to aquatic life, or more particularly, impairment of aesthetic and recreational resources. Even if the material is considered toxic, we believe that the method and locale of disposal assures no damage to the ocean and is a safe and reasonable method of disposal.

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Liquid Wastes

The liquid wastes are trucked in tank trucks almost daily from Myerstown and accumulated in a 1,000,000-gallon capacity tank at Paulsboro, New Jersey. Shipments to sea by barge are made when 500,000 to 800,000 gallons of material have accumulated. Removals to the ocean take place about every six weeks. Before a shipment is made, the U. S. Army Engineer District, Philadelphia, Pennsylvania, and the U. S. Coast Guard are informed of the contemplated shipment. The ship's officer in charge is instructed to report the latitude and longitude at which disposal is made to the U. S. Army Engineer District following disposal. It is our understanding that these instructions have been carried out consistently. The materials are barged out to sea to a point believed to be beyond the continental shelf and at least 100 miles from the coastline. Past practice has been for the barge to be towed on a triangular course while disposal is being made. It is our understanding that the area within the triangle is approximately 30 square miles. The saline arsenical solution immediately disperses in the sea water which itself contains pentavalent arsenic and salt. There are at least 50 tons of arsenic in a cubic mile of sea water and over 700 million tons of salt. The ocean currents are constant and strong in the area where disposal is made and facilitate the dispersal of the material and its movement away from the American continent. There is no

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reason to believe that this dispersal causes any injury to marine or aquatic life.

This method of disposal is employed because the materials are "soluble" and will disperse readily and rapidly in sea water without any possibility of the material coagulating and being encountered in the concentrated form by marine life or human beings. In our judgment, there is no offense to the environment either from the point of view of toxicity or from the point of view of aesthetics involved in this method of disposing of this material.

Our judgment with regard to the innocuous effect of our ocean disposal practices was based on:

(1) Our knowledge of the beneficent effect of the ingestion of arsanilic acid feed supplements by poultry, livestock and fish.

(2) The fact that our industrial health record at our manufacturing facilities has been excellent throughout the almost 11 years that we have been producing arsanilic acid and related products at the Whitmoyer plant. The health of our workers has been monitored both by a plant physician and by the Industrial Hygiene Department of the Pennsylvania Department of Health and no incident of injury to health of any worker has been attributed to their exposure to arsenic or any of its derivatives.

(3) A survey of the literature on the toxicity of pentavalent arsenic and the importance of the distinction in this respect between the pentavalent form and the trivalent form. (See Attachment I.)

(4) Our observation of the effect on the environment and ecology in the vicinity of the Whitmoyer plant of inadequate treatment of the industrial wastes for the period from 1959 through 1964. The disposal in the vicinity of the Whitmoyer plant of these industrial wastes by the previous owner without adequate treatment resulted in the presence of a considerable amount of these materials, particularly the liquid wastes, entering the Tulpehocken Creek and moving down the Tulpehocken to the Schuylkill River into various municipal water treatment systems and eventually into the saline waters of the Delaware Bay and the ocean. At no point in this passage of the material from the plant site to the ocean was any adverse effect on land and aquatic plant life, domestic and wild bird and animal life, marine life or human health observed by anyone. The levels of arsenic in the Tulpehocken Creek that were present at various times during this 5-year period, and which were present in late 1964 when the previous practices were abruptly halted by the new owners of Whitmoyer Laboratories, exceeded by far any possible concentration that could have been sustained for any significant period of time 100 miles out to sea as the result of the barge disposal of these liquid wastes from 1965 on. The significant fact is that during this entire period, from 1959 on, the Tulpehocken Creek has regularly been stocked with trout by the Pennsylvania

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Fish Commission, and at no time has there been any fish kill in the Tulpehocken Creek attributed to the presence of arsenical wastes in the creek. As a matter of fact, Rohm and Haas Company and State of Pennsylvania sanitary engineers, biologists, and industrial waste experts observed fish moving in an active and healthy fashion in the Tulpehocken Creek late in 1964 when the concentrations of the liquid industrial wastes in the Tulpehocken Creek were much higher than would occur in the ocean as a result of dispersal of this waste at sea. The fact that there were no fish kills in the Delaware River nor in the saline waters of the Delaware Bay during the period that untreated liquid wastes were inadvertently moving into these waters in 1964 ought to provide some assurance that there is no adverse synergistic effect resulting from the addition of this waste to these fresh and saline waters.

HISTORY OF THE PROCEDURE
DESCRIBED ABOVE

The ocean disposal of liquid wastes was initiated in the spring of 1965, and that of solid wastes in the spring of 1966. The necessity for this form of disposal arose from the fact that there was no other practical means of disposing

of the waste generated by the production of arsanilic acid and other arsenical products at Whitmoyer Laboratories, Inc., in Myerstown, Pennsylvania. The manufacturing operations at Whitmoyer are conducted under permits issued in 1965 by the Sanitary Water Board of the Commonwealth of Pennsylvania and the Delaware River Basin Commission. The operating permits were issued on the understanding by all concerned that the liquid wastes would be disposed of at sea and the solid wastes by being deposited in an impervious concrete bin until the capacity of this bin was reached and thereafter would be disposed of at sea.

The actual movement of the liquid and solid wastes through the Port of Philadelphia, through the territorial waters of the United States and into the Atlantic ocean was arranged after discussions with the Coast Guard and the U. S. Army Engineer District. It was at the suggestion of the U. S. Army Engineer District that the practice was established of disposing of the liquid wastes at a distance approximately 100 miles from the United States coastline.

It has been our understanding that the movement of industrial wastes from the Port of Philadelphia to the sea has been monitored during the past few years by the Delaware River Basin Commission, the U. S. Public Health Service, and the U. S. Army Engineer District. We have never been advised

of the scope of this monitoring program, but because of inquiries which we have received we have assumed that it was taking place and we have relied on this understanding.

None of the state or federal agencies which were informed in detail regarding the character of the wastes at Whitmoyer and knew that these wastes were being deposited in the ocean, nor the agencies which learned of the movement to sea of these deposits as a result of surveys which they have conducted, has raised any objection to this practice. All of the protests which have been reported in the press have been based on incorrect information obtained from uninformed sources.

DISCLOSURE TO THE DILLINGHAM
CORPORATION, JUNE 18, 1969

By letter dated June 9, 1969, the oceanographic engineering firm of Dillingham Corporation of La Jolla, California, informed Rohm and Haas Company that it was conducting a survey of wastes then being discharged at sea by barge and by ship from 16 U. S. coastal cities. The survey was being conducted under Contract No. P.H. 86-68-203 with the Bureau of Solid Wastes Management, U. S. Public Health. We were asked to describe the materials which we were then disposing of at sea and information was requested regarding the amounts involved, the date of initiation of the practice and other details.

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By letter dated June 18, 1969, Mr. Stanley S. Paist, manager of water and air conservation for Rohm and Haas Company and its subsidiaries, supplied the information requested by the Dillingham Corporation. We reported that both liquid and solid arsenical wastes had been since 1965 and were currently being disposed of at sea and that currently the volume of disposal amounted to 21,600 tons of liquid arsenical wastes per year and 520 tons of solid arsenical wastes per year.

In its report, "OCEAN DUMPING - A National Policy," the President's Council on Environmental Quality noted its indebtedness to the Dillingham Corporation for its study of what it referred to as a survey of "barged wastes" prepared under contract to the Bureau of Solid Wastes Management, U. S. Public Health Service.

In its policy statement, the Council referred to the Dillingham Corporation's survey as a "20-city survey." In its letter to us the Dillingham Corporation referred to a "16-city survey," and in its survey it referred to disposal both by barge and by ship.

We assume that the Dillingham survey, to which our response was made in 1969, was the same survey referred to in the foreword of the Council's report to the President; but even if there were two Dillingham surveys, it should be a fair inference that the information contained in our reply

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of June 18, 1969, was available to the Council on Environmental Quality.

We make special reference to the information which we supplied to the Dillingham Corporation even though many other disclosures of our disposal practice were made to federal and state agencies because it is conceivable that these disclosures, beginning in 1965, did not come to the attention of the Council and other agencies which have recently concerned themselves with the problem of ocean disposal of wastes. However, it seems to us that we were entitled to assume that the information which we supplied in 1969 did come to the attention of these agencies and indeed it appears from the foreword to the Council's report to the President that they had before them the results of the Dillingham survey which must have included our report.

Not only did no government agency ever question what we were doing, but it would appear from an examination of the Council's report on ocean dumping that our report of the disposal of arsenical wastes raised no substantial issue in their minds as they assessed the overall effect of the disposal practices which were described for them in the Dillingham Corporation's report.

DISCLOSURE TO THE U. S. PUBLIC
HEALTH SERVICE, MARCH 12, 1965

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By letter dated February 23, 1965, addressed to the
U. S. Army Engineers District, Corps of Engineers, Supervisor

of the New York Harbor, Chemline Corporation of Elizabeth, New Jersey, requested of the Corps of Engineers on behalf of the Rohm and Haas Company a permit to dispose of approximately 15,000 gallons per day of a waste solution containing arsenic. The Chemline Corporation attached to its request for a permit an analysis of the liquid waste prepared by the Rohm and Haas Company disclosing that 3.4% of the waste was arsenic and giving a detailed breakdown of other materials present in the liquid waste.

On March 12, 1965, Colonel Miletich of the Corps of Engineers transmitted a copy of the request for permit from the Chemline Corporation together with the analysis of the liquid waste to the Public Health Service, Department of Health, Education and Welfare, requesting that the Public Health Service supply an assessment of the possible "deleterious effects on such chemical wastes might have on the fish and wildlife population and on public health in the area."

Colonel Miletich said that a dumping ground 13½ miles from the nearest shore, latitude 40° 20' N and longitude 73° 40' W was under consideration.

As far as we know no reply was ever received by Colonel Miletich from the Public Health Service.

Ultimately, the liquid wastes were disposed of from the Port of Philadelphia. The Corps of Engineers at the

Philadelphia Port expressed no objection to disposal at a point 110 miles from the coastline.

The letter of the Chemline Corporation to the New York Corps of Engineers reflects that Chemline had already been advised by that office that disposal 110 miles out to sea would be satisfactory. This correspondence shows that the position of the Corps in Philadelphia and New York was consistent and that when disposal only 13½ miles from shore was considered, the Corps was concerned about the possible adverse effects on the ocean and requested guidance from the U. S. Public Health Service.

This correspondence also shows that we acted reasonably in assuming that a conscientious assessment was made of the consequences of what we proposed to do. Furthermore, it establishes that the Corps' action, in permitting disposal far out to sea, was based on a conscientious review by the Corps of the problem which our proposed course of action posed for them. In other words, we were justified in assuming that our government was acting responsibly.

We have detailed the extent of the disclosure to the Dillingham Corporation and to the Corps of Engineers of New York City and, through them, to the U. S. Public Health Service in order to establish conclusively that knowledge of

what we proposed to do was in the hands of responsible government agencies both before and after our practices were initiated, and also to establish the basis for our reliance upon a responsible government review.

We fail to see how in view of these disclosures we can possibly be castigated as irresponsible. We suggest that it is not irrelevant for us to dwell on this issue of our responsibility because any government agency considering an application for a permit from us at this time to continue our practice of such disposal of arsenical wastes should certainly consider whether or not we are a responsible and reliable firm. We submit that we have established that we have acted responsibly in assessing what we proposed to do, in clearing our procedures with the Coast Guard and the U. S. Corps of Engineers, in informing concerned government agencies and in relying upon these agencies to inform us if they were or became concerned about these practices.

Submitted by

ROHM AND HAAS COMPANY
and
WHITMOYER LABORATORIES, INC.

March 23, 1971

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